Fermilab
FY2002 Self-assessment
Process Assessment Report
For
Division/ Section: Particle Physics Division

Date: October 2, 2002

Division/Section performing assessment

Particle Physics Division (PPD)

Name of organization that owns assessed process

PPD Electrical Engineering Department

Organization Strategy

Work request records provide a means to track and evaluate the quantity and diversity of the work done by the "Electronic Assembly and Prototyping" sub-group. This information is useful in two ways 1) In order to understand the job requirements, and 2) In order to help plan for the human and material resources that are required on an on-going basis in order to meet the commitments of the Electrical Engineering Department.

Names of Personnel on Assessment team

Richard D. Hance

Name of process assessed

Work Request Records/Electronic Logbook of the "Electronic Assembly & Prototyping" sub-group of the Infrastructure Group, Electrical Engineering Department, Particle Physics Division

Brief description of process to be assessed

The Electronic Assembly & Prototyping sub-group is available to provide electronic fabrication and assembly service primarily to the Electrical Engineering Department; but also to any of the various Fermilab groups from any department, division, or experiment.

The type of services performed is light fabrication, assembly, and repair of electronic devices, cable terminating, printed circuit board rework, and occasional electronic prototyping. Some field installation and troubleshooting is also done when no other organization has been identified as having responsibility; for example maintaining equipment in the Lederman Science & Education Center. In the case of fabrication and assembly work, this group is used for small quantities and quick turn-around. The quantities are generally too small to benefit from outsourcing of the work and the services can be performed quickly and efficiently in-house.

The process being assessed is: the "record keeping" of the type and quantity of work being done by this sub-group. This record keeping has traditionally been via individual paper work requests, and more recently via electronic log entries.

1. Are metrics associated with this process? If so, what are they?

No contractual metrics are involved. Up until this assessment, no internal metrics have been applied either. This record keeping has been performed mostly in order to have a historical record of work done by this group. However, this process has the potential for use in manpower, budget, space, and equipment planning purposes and thus can be a useful component of department management. As a result of this assessment, the process can and should be subjected to a means of evaluating its quality and thus ensuring its usefulness. The process can be evaluated by examining a representative sample of work request and log entries for the presence of the following "indicators":

1. Date the jobs were received.
2. Name of person/organization making the requests.
3. Description of the work.
4. Equipment resources required.
5. Skills required.
6. Names of the persons doing the work.
7. Time spent by each person.
8. Status of the Job (in process/complete/etc).

All of this information will allow managers not only to track and cost the effort of this sub-group; but also to analyze and optimize for the typical type of work, and to be prepared for changes in demand that might require personnel training, equipment purchases etc.

For this assessment, a sampling of the "documented" work requests and electronic log entries over approximately a one-year period will be examined. The total number of opportunities for information entry (indicators) will then be compared with the percentage of information actually entered and the results used to assign a grade according to the following:

Outstanding - 7 of 8 indicators (87.5% or better)
Excellent - 6 of 8 indicators (75% or better)
Good - 5 of 8 indicators (62.5% or better)
Marginal - 4 of 8 indicators (50% or better)
Unsatisfactory - less than 4 of 8 indicators (less than 50%).

2. What are the names of the procedures associated with this process?

Manual Work Request - Up until recently, the procedure has been to manually record all work request data on paper "Work Request Forms". These forms provided entry points for all of the information needed to initiate, complete, and track the typical work request. Thus the procedure was to complete as much of the requested information as was relevant to the type of work being requested.

Electronic Log Book Data Entry - Beginning August 1, 2002, an electronic logbook was added in addition to the paper work requests in order to make it more convenient to query for information. The addition is a simple matter of entering data in a table in the electronic logbook. The procedure associated with the process is to merely follow the on-screen template and enter applicable data in each column.

3. Are these procedures being followed? Are they current?

The "Manual Work Request" was being followed to some extent. Enough information was initially entered to allow the group to complete the work. After that, no further entries were made which might have provided useful management feedback such as what resources were actually required to accomplish the task. Not a single work request over the last year contained an entry for completion date or for time spent, resources required etc. (In all fairness, this information was not relevant to the intended purpose).

The "Electronic Log Book Data Entry" procedure is relatively new and in addition has been modified retroactively as a result of this assessment to provide additional useful information. The procedure was being followed since initiation of the electronic logbook in August. The modified logbook will show missing entries previous to this assessment because the data was not required in the first electronic version.

4. Describe the methodology used to assess this process.

For this assessment, a sampling of 50 of the 100 "documented" work requests and electronic log entries over approximately a one-year period were be examined. The total number of opportunities for information entry (indicators) was then compared with the percentage of information actually entered and the results used to assign a grade according to the metric

The process was also examined for relevance as well as for adherence to procedure. Thus we chose to look at the process as a whole for the future as well as to determine a grade for past performance. This is a relatively simple process. We start by examining the tangible results of the process (in this case, written work requests and the electronic logbook) and then proceed to evaluate 5 questions. The official grade however is based on the metric.

1. What function are we trying to accomplish with this process?
2. Is this a useful function?
3. Is this process an efficient way to accomplish this function?
4. Is the process being followed? (This item is the sole basis of the metric).
5. Can the process be improved?

5. Results of the assessment:

a. *Are the existing process controls adequate?* - The original written "Work Request Form" provides entry prompts for a considerable amount of information. Some of the information was meant to identify the requestor so that the work could be returned to its submitter once it was finished; and to describe the work that needed to be done. These particular items of information were always completed because they are the very essence of the request. They are inherent process controls. They are needed to complete the work and return it to its owner. The rest of the form requests intangible information useful only to management such as completion and pick-up dates, approval signatures, etc. None of this information was routinely completed and thus is not available for effort reports, resource allocation, manpower requirement evaluations, etc. The most likely reason for this information being left out is because of the effort required at the end of a job to locate the form (out of a stack of forms) and to complete the information. With seemingly no practical reason to do so, and no easy manner to do it, it is unlikely that the accounting information would have been entered -- and in fact it was not. The new "Electronic Log" is expected to overcome this deficiency by presenting the previous work requests in spreadsheet form on the computer screen whenever new jobs are entered. The blank spaces in previous jobs should present a reminder and an opportunity for entering the required data regarding completed work painlessly.

b. *Have any notable practices been identified?* - This is a relatively simple process and does not offer much opportunity for creativity. Thus no notable practices were identified that might be useful in other processes.

c. *Have any major deficiencies been identified?* - The major deficiency as described earlier is simply a general lack of completing the information in both the written

"Work Request form" and the "Electronic Logbook Entry". It should be mentioned that the process worked to the extent that it was originally conceived - that is to provide information to the Electronic Assembly & Prototyping Group in order to complete the work request. However, this assessment has identified several other uses for the information specifically that of providing management with information that can be used to analyze effectiveness of the group and to plan for and manage manpower and equipment resources.

d. *Is the process working effectively? What improvements can be made?* - The process, though effective for completing the work and returning it to its requestor, was not very useful for use in manpower and resource management. Improvements to the process have been identified and describe earlier in this report. Specifically, to modify the "Electronic Logbook" such that it requests additional information that will be useful in manpower and resource management. Furthermore, the addition of the "Electronic Logbook", which was done before this assessment was started, will make it more convenient to enter the information, and more likely that it will be done. A sample of the "Written Work Request" and the "Electronic Logbook" is included at the end of this assessment.

e. *How does current performance compare to last assessment, other similar labs, industry?* - No previous assessment was done on this process. The process itself is similar to typical "Job Records" kept by any organization that has a "Quality System" in place and that uses "Quality Procedures" to track work requests, customer complaints, non-conforming product, and change control. As a result of this assessment, the process will be monitored more closely to ensure that it accomplishes its expanded purpose.

f. *What are the results for the metrics?* - The sample of 50 work requests and electronic log entries presented the opportunity to enter 50 X 8 = 400 indicators. Of the 400 possibilities, only 185 were entered. This provides a percentage of 185/400 X 100 = 46%.

g. Adjectival grade achieved - As assessed, the process receives a grade of "Unsatisfactory". The process did achieve its local goal of minimally documenting the requirements of the work as submitted. However, as a result of the assessment, it is expected that the process may immediately become "satisfactory" for two reasons: 1) The process will be easier to perform (and monitor) and thus eliminate some of the human factor, and 2) The information gathered will become more useful in the area of manpower and resource management.

Identified opportunities for improvement

Improvement opportunities from the current assessment or a statement of optimal performance for the process. - Improvement opportunities were quickly identified as a result of this assessment and have been implemented. No additional budgeted funds are required to improve the process since it merely required obvious modifications to the data entry form and no additional time is required to gather the information. The projected savings may be somewhat intangible except for the specific timesavings involved in actually making the data entries. Since electronic entry is more convenient and faster than paper entry, the process itself can be expected to save approximately 15 minutes per work request. This "tangible benefit" is relatively insignificant. Since there were approximately 100 written requests processed over the last one year period (plus 100-200 verbal requests), approximately 3.0 man days of "Lead Tech" time would be saved - providing a cost savings of perhaps $900.00 in salary, wages, fringe benefits etc. This assumes that the "Lead Tech will be productively occupied elsewhere rather than filling out forms. This is of course much less than the cost of doing the assessment. However, the intangible benefits resulting from the improved process providing the tools to better manage the resources can be expected to save considerably more. By having the information available to manage the resources better, it might be possible to expand the function of the Electronic Assembly & Prototyping Group such that it is able to accept and accomplish work that may otherwise have been contracted to commercial firms. In this case, the savings could be significant; but rather difficult to effectively predict.

Schedule for implementation of improvements

The improvements resulting from this assessment have already been implemented since they merely required modification of an electronic form. The person entering the data has already been informed of the new procedure and has begun using it. Furthermore, the switch to an "Electronic Logbook" now makes it possible for managers to monitor more closely the work being scheduled by this group. This in itself will allow managers to quickly assess the availability of this particular collection of resources.

Status of improvements from previous assessment

No previous assessment has been performed on this process.

Attachments (supporting data, worksheets, reports, etc.

1) Procedure for processing a work request
2) Sample of old written "Work Request Form"
3) Sample of new "Electronic Logbook Entries".
4) Organizational Chart of Group Using the Process Being Assessed

Procedure for Accepting a Work Request

(Electronic Assembly & Prototyping Sub-Group)

1. **Anyone can submit a work request.**

2. **All work requests are submitted directly to the Section Leader[1], usually in the form of a "Written Work Request".**

3. **The Section Leader ascertains whether the work is within the capabilities of the group considering the resources required and the deadline for completing the work. Unusual requests will be discussed with the Infrastructure Group Leader, or the Electrical Engineering Department Head.**

4. **The Section Leader ascertains whether all documentation and materials that will be required are being submitted with the work request. If any purchases are required, then the requestor must provide a budget code.**

5. **The Section Leader opens the "Electronic Logbook" on his computer and enters the data in the spreadsheet.**

6. **The Section Leader then ascertains that the necessary tools and equipment are available to complete the work.**

7. **The Section Leader then assigns the work to a Fabrication Tech depending on the skills that are required.**

8. **The Section Leader monitors the progress of the work and provides any training, tools or other resources as required. The Section Leader is responsible for the quality of the work.**

9. **When the work is finished, the Section Leader inspects it for quality and completeness, and then contacts the requestor to arrange for pickup or delivery of the completed work.**

10. **The Section Leader then opens the "Electronic Logbook" on his computer and enters the remaining information about the job such as person assigned, time spent, and completion date.**

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[1] **All references to "Section Leader" refer to the "Lead Tech" or "Assistant Lead Tech" if the "Lead Tech" is not available.**

Sample of Old written "Work Request Form"

Fermilab

PPD-TC-EAP Group Work Request

Name(s): JOHNNY GREEN Date In:_____ Job #_____

Experiment or Group: D0 KO EAP Tech:_____

Telephone: 3392 Fax:_____ E-mail:_____

Budget Code: DIL Qty. Needed: 1 Date Needed: 2/4/92

Effort Report Code:_____ Hazard Analysis (Y/N) _____

Work Requested: 3/4 25 WIRES TO VRBC BOARD

Special Requirements:_____

Requester Signature: _____

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Status:

Schematic: #_____ Drawing: #_____ Start Date: #_____

Parts [O] [BO]:_____ Films:_____ PC Boards:_____

Assembled:_____ Tested:_____ Q.A. Inspected:_____

Comments:_____

Date Completed:_____ E/E Signed: _____

Pick-Up Date:_____ Accepted By:_____

Revised 3--6-00 by ss

Sample of New "Electronic Logbook" Entries

Electronic Assembly & Prototyping Group Electronic Logbook

Date Rec'd	Req by:	Description of work	Equip Req'd	Skills Req'd	Pers Assigned	Time Spent	Date Finished
9/17/02	BTEV (Hansen)	Stuff 5 – 5 channel preamps	SMT	SMT soldering	Lupe	1 md	
9/17/02	Pixel Group (Gabriele Chiodini)	Stuff 7 detector boards	SMT	SMT soldering	Lupe	1 md	
9/18/02	D0 (John Foglesong)	Fabricate 20 lockout signs	laminator	Procurement	Carmen		
9/18/02	Lederman Science Center (Spencer Pasero)	Remove electronics from The Bend The Beam exhibit and install in new place.	Hand tools	Electronics, Mechanical, Project Specific	Curt	1 md	
9/18/02	CDF Jason Galyardt)	Punch 5 holes in 2 existing computer boards	Hand tools	Mechanical	Johnny	0.5 md	9/10/02
9/20/02	E907 (Peter Barnes)	Build up 2 CLK/TRG NIM modules	Hand tools and soldering	Electronic Assembly			
9/20/02	E907 (Peter Barnes)	Diagnose & repair dead "TPC Sticks"	Test equipment	Electronics	Bob		
9/23/02	Beams division (Stephen Pordes)	Make up 24 – 8ns rg58 cables	Hand tools	Cable terminating	Johnny	1 md	9/24/02
9/23/02	CMS (Nikolai Bondar)	Replace 1 – 80 pin I.C. on app. 90 boards	Chip remover machine & hand tools	SMT soldering			
9/23/02	D0 (Pat Sheahan)	Wire jumpers on DFE Backplane	Hand tools	soldering	Lupe		

Organizational Chart of the Group Using the Process Being Assessed